SPEED OF THE EARTH:

The Illusion and Experience of Speed and Scale

by

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ABSTRACT

The Speed of the Earth is a proposed sculpture dealing with light as pure experience within the context of short-lived rapid movement and large scale horizontal orientation within the environment. This will be accomplished through the use of rapidly sequenced strobe lights sited in a straight east/west axis line, which create a momentary event of pure light that is both corporeal and illusive. The proposed sculpture will also addresses the concept of relative perception, the light event itself creating a tangible depiction/illustration of the speed of the Earth's rotation on its axis and representing a fixed point in space that reverses the standard point of reference for the viewer's basis of location.

This thesis explores the use of linear and temporal scale in environmental art, concentrating on specific works that have direct association to aspects of the proposed thesis sculpture. The strobe light is briefly discussed. The artist's personal background and perspective are described within the context of the evolution of the thesis sculpture. The proposed thesis sculpture and its planned implementation and application is described and documented.

Thesis Supervisor: Otto Piene
Title: Director of the Center for Advanced Visual Studies

PREFACE

The research for this thesis has been conducted with the intention of investigating four areas that reflect the primary elements of my proposed thesis sculpture: (1) pure horizontal linear scale; (2) magnitude of directly experineced speed; (3) the use of pure light and illusion; and (4) the conceptual overlay of the earth's rotation.

During the process of developing this thesis, its emphasis within thesse four areas has shifted. The strongest initial interest was in the sheer scale of linear dimension and speed. This led to a narrowly focused but purposeful research into the works of artists who created large scale art in the open landscape. These works, perhaps best identified as "earth" or "land" art, became identified in the art press of the 1960's and 70's as "environmental art". My use of this term to describe these works is not meant to imply any exclusivity for these artsits to that term. The term equally, and especially currently, applies to work that I subsequently describe, by artists who are often referred to as creating light/technology/space art.

The works of the first group of artist that I have concentrated upon were works created in the western desert or mid-western plains of the United States. Although I know these works only through print, I am, as a native of the Los Angeles, acutely aware of the quality of that type of landscape - open, expansive, with a clear view to the horizon and thus a heightened sense of the horizontal - and I have a profound identity with it, especially in terms of the scale I wanted to work with as an artist. The Speed of the Earth, as originally invisioned, was set in the open desert. It was from this framework that the early part of my thesis was approached.

It was my intention to refrain from inclusion of the work of current or former Fellows of the Center for Advanced Visual Studies. My association with some of these artists dates back as much as twenty-four years, and I find it difficult to approach their work or writings with the proper neutral analytical perspective. In the end I have taken exception to this intention in order to discuss specific works which address aspects of environmental art that directly relate to my proposed thesis sculpture.

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The Speed of the Earth is a sculpture of and within the environment. It deals with time and scale. With speed, and light, and illusion. It redirects our daily orientation within the immediate environment of moment and place toward the greater Earth scale of time and size and location.

The Speed of the Earth deals with time. It is both momentary event and eternal cycle. It depicts the brief intersection of a point in space with a spinning Earth, an instant of intersection that will repeat every twenty four hours until the Earth runs down. It is performance event and perpetuity.

The Speed of the Earth deals with scale. The proposed thesis sculpture will be 1,000 feet in length. Future versions should run to the horizon. And it implies a scale equal to the latitudinal circumferance of the Earth, 18,000 plus miles for this location. The piece can be any segment of this 18,000 mile run. For the segment implies the whole.

The Speed of the Earth deals with speed. Speed on a scale we have never encountered at this proximity. A speed we have never experienced viscerally. A speed we move at in every instant of our lives.

The Speed of the Earth deals with light. For light can create illusion, and illusion can depict the real. Intangible, yet seemingly corporeal. A sequence of individual strobe flashes enters the eyes and perception sees a solid ball of light racing past us. Pure light becomes substance.

The Speed of the Earth deals with relative perspective. Einstein postulates two different experiences of the same event, from two different perspectives, from two different orientations. Our Earthbound perspective is suspended. It is we who move, not just the heavens. The moving light is fixed. The fixed viewer is moving.

The Speed of the Earth deals with charm. Simple charm. Of simple lights upon simple poles and simple illusions of racing white energy.

LINEAR AND TEMPORAL SCALE IN ENVIRONMENTAL ART

The setting of art within the environment and the use of the environment as a primary component of that art is a relatively recent phenomena in the history of modern art, beginning in the 1960's. A number of American artists, who were often grouped by the then current art press as the "environmental art" movement, concentrated, from the late 1960's to the late 1970's, on large scale works of "art in the land"(1). For the purposes of this thesis, I will be discussing, in this initial section of the thesis, the work of a small number of these artists, concentrating primarily on those whose work focused upon or included primary elements of linear scale.

The immediate evolution of these artists' works to environmental scale stemmed from a number of factors. Some of these had to do with elements of the individual artist's personal background. Ohers were much more general.

There had been, by the early 1960's, a growing interest in expanding the definition of art in terms of

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(1) Alan Sonfist, ed. Art in the Land. New York: E.P. Dutton, Inc., 1983. pp. ix-xii, 8-57.

scale and medium, producing a great deal of experimentation in art and technology, expanded work in light art(2) and performance art, and increased presentation of non-traditional work in the outdoors, accompanied by a rethinking of the relationship of art and the environment.(3),(4)

For the specific environmental/land artists I am initially focusing, some of the strongest factors were a desire to work on a larger scale and a reaction to the object orientation of traditional and current modern art. Both factors were expressed as a desire to break out of the restrictions (physical and sociological) of the gallery/museum.

The concurrent movements of performance related art and technological art shared many elements with the environemntal art movement, and the distinction between

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(2) Artists such as Thomas Wilfred had been working with electrical light as a medium since the 1920's, but the 1960's saw a sudden increase in and public acceptance of the use of light in as a medium. Jack Burnham, Beyond Modern Sculpture. New York: George Braziller, 1968. pp. 285, 294-311.
(3) Gyorgy Kepes, ed. Arts of the Environment. New York: George Braziller, 1972. pp. 1-12.
(4) Douglas Davis. Art and the Future. New York: Praeger Publishers, 1973. pp. 116-119.

these categories were often blurred and in many ways unnecessary.

The most direct predecessors of this specific group of artists were the "minimalist" artists like Tony Smith, Carl Andre and Michael Heizer(5), who began to create works that, while still very physical sculpture, were less concerned with the components that make up a piece than with the impact of the piece as a whole. These pieces grew to a scale that required outdoor siting, which in turn removed the sense of "precious" object" that an exhibition space implies for an artwork. As the work moved outside, the new setting of the environment (vs. the exhibition space) had a powerful impact on the implications and context of the work as well as the media that would be employed.(6)

But for these specific environmental artists, their work, especially in its orientation to time and place,

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(5) I am concentrating here on those artists of the 1950's and 1960's whose "minimalism" was expressed in the the 3-dimensional physical medium of sculpture.
(6) Rose, Barbara, American Art Since 1900, rev. & expanded ed. New York: Praeger, 1975. pp. 268-279.

raises associations with much earlier predecessors, whose large scale physical expressions were driven in part by humankind's oldest fascinations and motivations for artistic expressions - the desire to understand our place, both physically and temporally, within the immediate larger environment of our physical horizons and within the grander context of the cosmos. Much of environmental art (including more recent and technologically oriented works) carries associations to these primary urges, and in that sense is a continuum, "the latest expression of an artistic impulse that is virtually ageless". (7)

These desires of earlier civilizations to both understand and express took the form of structures or related physical expressions, often responding to the phenomena of the cosmos and their associated ontological implications, beautiful and powerful in their own right, but closely tied to sociological and spiritual needs.

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(7) John Beardsley. Traditional Aspects of New Land Art. Washington, D.C.: Smitsonian Institution Press, 1978. p. 7.

THE FIRST ENVIRONMENTAL ARTISTS

"The spin and the orbital motion of the earth, whose great consequences we call *day and night* and *the cycle of the seasons*, are built biochemically deep into the function of each living thing." Philip Morrison(8)

The earliest large scale physical expression of our place within the universe and the systems of the cosmos were structures designed to denote astrophysical phenomena.

The rising and setting of the sun are the most immediate phenomena by which we measure our existance on earth. This cycle is measured within the larger cyclical changes of the seasons of the year (accompanied by the phases of the moon). These cycles engendered a spiritual response in early civilizations, who inevitably constructed places in the environment to demark these cycles in an attempt to understand, or at least anticipate and revere the forces of nature and the cosmos around them.

As these early civilizations observed the

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(8) Kenneth Brecher and Michael Fiertag, ed. Astronomy of the Ancients. Cambridge: The M.I.T. Press, 1979. p. vii.

characteristics of the heavens, they did so with their naked eyes. The chronological observation of days within the annual cycle of seasons was necessary to bring a sense of spiritual order and to arrange the life of people within a civilization in terms of shelter and sustenance, along with accompanying ritual. The most obvious and important temporal demarcations within this cycle were the solstices and equinoxes.

The creation of structures oriented to and dedicated to astronomical phenomena occur indigenously throughout the civilizations of the world - from the cairns and stone circles in the British Isles to the Pyramids of Egypt to the "observatories" of the Asian continent to the astronomical markings and "observatories" of the Americas.

I will concentrate primarily on the civilizations of the Americas. The environment and landscape that they responded to is native to me, even if filtered through the results of modern industrial civilization. I will first, however, offer some reference to the constructions from other continents mentioned above.

The stone circles of the British Isles, though quite primitive, exhibit man creating form on a large scale to

symbolize place within the environment and to provide an established point of observation toward the day and night sky. These circles number in the hundreds, the most sophisticated of which is Stonehenge, the result of a series of circles built and expanded upon previous circles. The setting of these circles within the relatively open landscape and their simple detail (excepting Stonehenge) is quite similar to the sun circles of American Indians.(9)

The Great Pyramid is a powerful expression of a belief system that incorporated important symbolic alignments to the heavens. The main pyramid, 765 feet per side, covering 13 acres at its base, is aligned with the cardinal axes to within 1/10th of a degree - as amazing a feat of precision as the structure itself is of scale. While not designed as a structure for astronomical observation, it contains airshafts that were precisely aligned to stars in the northern and southern skies. These shafts were not for star viewing, but rather for a spiritual purpose - to conduct the soul of the Pharoah

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(9) Dr. E.C. Krupp. Echoes of the Ancient Skies. New York: Harper & Row, Publishers, 1983. pp. 214-220.

to the specific location in the heavens where he would join Osiris, the god of rebirth, in commanding the eternal revolution of the stars.(10)

The Forbidden City of China is also precisely oriented to a cardinal alignment. Associated with this "cosmic axis" is the sundial on the platform of its Hall of Supreme Harmony, which invoked the order of celestial time and symbolized ethical, orderly government.(11)

While not of the magnitude of physical scale of the Great Pyramid or the Forbidden City, we find specific astronomical structures of great accuracy in regions of the Asian continent.

The 13th century Chinese astronomer Guo Shou Jing built a 40 foot high tower at Gao cheng zhen that casts shadows measured to daily prescision as the noonday sun travels between the summer and winter solstice.(12) The compact tower sits boldly in the environment, with steep angled walls reminiscent of Mayan architecture, but with decorous stairways that recall Jantar Mantar, an

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(10) Evan Hadingham. Early Man and the Cosmos. New York: Walker and Company, 1984. p. 23.
(11) Krupp. Echoes. p.261.
(12) Ibid. p. 60-61.

observatory of even greater precision and fanciful beauty.

Built by the Sawai Jai Singh as a monument to science and astronomy, this intricately designed stone instrument in Jaipur, India indicted local time, the sun's declination, azimuth and altitude, the declination of fixed stars and planets and predicted eclipses.(13) I find a certain delight in a structure so precisely designed for detailed astronomical measurement that also displays such lyrical visual playfulness as a byproduct of its resultant design.

EARLY AMERICAN CIVILIZATIONS

The early civilizations of the Americas were accutely aware of astronimcal cycles, and we find the remnants of many large scale "instruments" that, while not of the complexity of Jaipur, did mark important astronomical points in time.

The Hopi-Navajo marked important days of the cycle/year by memorizing the position of prominent points on the landscape's horizon where the sun rose or set. By the act of doing this, a fixed relationship in the space

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(13) Prahlad Singh. Jantar-mantars of India. Jaipur: Holiday Publications, 1986.

between the viewer and these points on the horizon was inherently created, implying a defined landscape area that comprised a "found" astronomical instrument for these early astronomers.

For Central and Southern American cultures, these naked eye "observatories" became more formalized, with built towers as markers, such as those at Cuzco in Peru.

The Maya civilization constructed massive astonomical/spiritual "observatories" such as the complex at Uaxactun in the Yucatan. (It should be noted here that for early American civilizations, like so many other civilizations throughout the world, religion and "astronomy" were synonymous, and the astronomer and the priest were often the same.)

From atop a central pyramid, the sunrise on the solstices and equinoxes were marked by three prominent temples. These instruments/temples/palaces/civic centers were massive in scale, from hundreds to thousands of feet across and up to hundreds of feet high, their size serving purposes both scientific and symbolic.(14)

(See illustration on page 18.)

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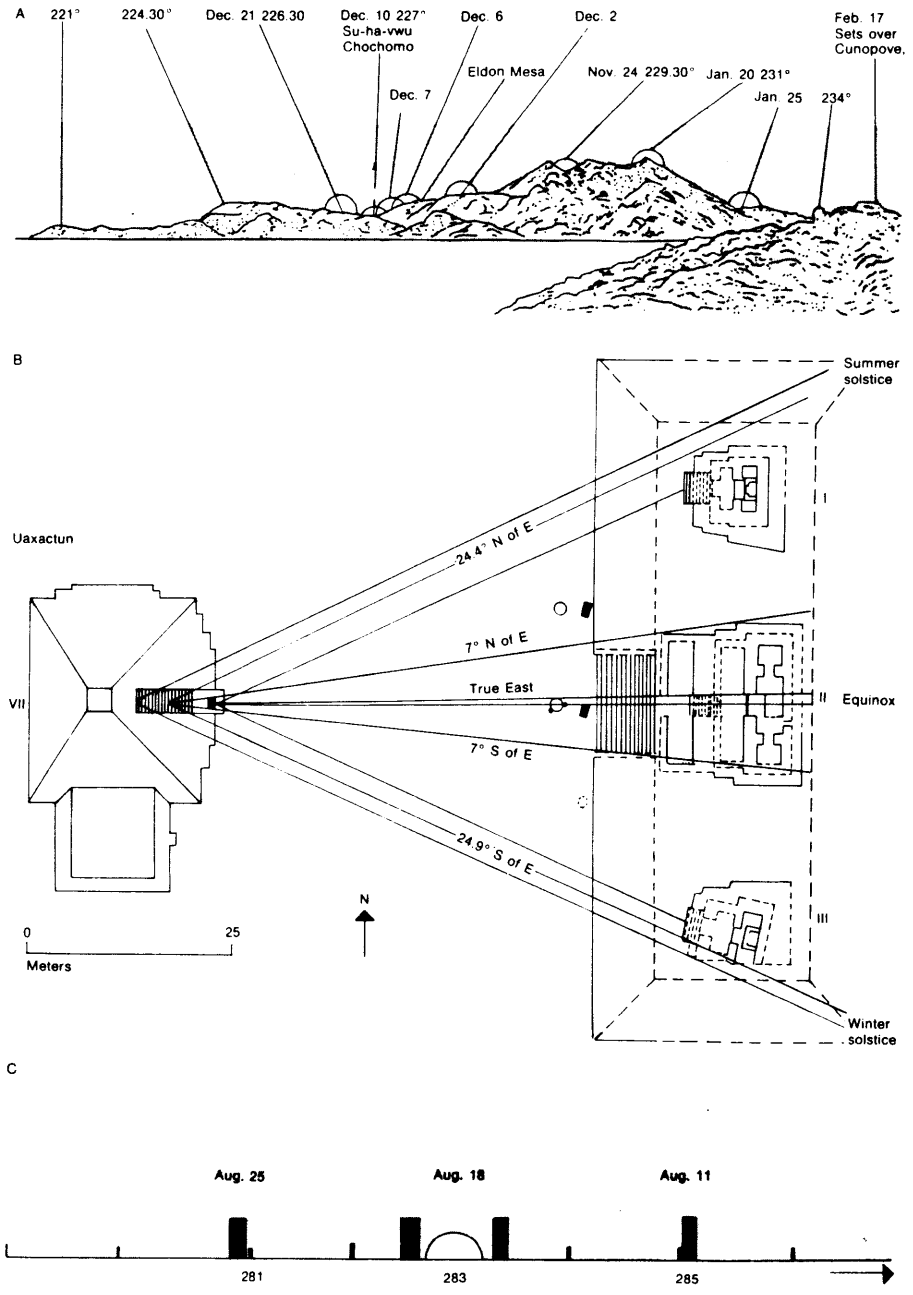
(14) Brecher. Astronomy. pp. 63-67.



Sun-watching schemes of (A) the Hopi-Navajo, (B) the Maya at Uazactun, and (C) the Inca at Cuzco.(15)

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(15) Brecher. Astronomy. p. 64.

I want to stress that these structures, like those of China, or India, were indeed astronomical "instruments", employing the most advanced technology of the times - the built form. In terms of scale, the astronomical baseline at Copan in Honduras, which aligns the sunset that starts the agricultural calendar, spans a 7 kilometer linear visual axis. This extended sightline allows a greater astronomical precision. The baselines at Cerro El Chapin span a straight line view of almost 14 kilometers - making this an instrument larger in scale than any linear accelerator and approching the scale of a supercollider.

In all of the sites I have discussed, an area of landscape/environment has been created or deliniated (whether defined by the viewing spot and outermost lines of markation or by complete structure as in the case of Uaxactun). This "defined" area, set within a larger landscape and operating as a marking system in time and space, oriented to specific astronomical events, could define many traditional modern environmental artworks. Specific reference can be made to Robert Morris's "Observatory" in Holland, which carries a direct and formal historical link to the structures of earlier

civilizations.(16)

The Mayan Temple/observatory at Chichen Itza also incorporated an alignment with other celestial axes, especially that of Venus, the most prominent "star" in the sky and one of important symbolic/religious association in many civilizations. For these American civilizations, the gods and their physical manifestations in the heavens became the basis of their art, architecture, religion, and society in general.

Celestial orientation can also be found in the sun circles or Medicine Wheels of the North American Indians. From Colorado to Alberta, these spoked, circular "earthworks" often exceeded 200 feet in diameter.

The simplicilty, yet stark grandeur of the Medicine Wheel conveys much of what drives current environmental art. The marking, or shaping, of such a large area of open earth, sets a series of perspectives in action. At a human scale, the wheel is large. It requires this scale of dimension to be of significance within the open landscape. The levels of magnitude continue out into the cosmos. And

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(16) Lucy R. Lippard. Overlay. New York: Pantheon Books. 1983. p. 110.

it is this sense of the majestic that drove these early artists and drives artists of similar scale today. For early civilizations, this sense was a part of their society, their daily ritual, and their active sense of being in the world and the universe. For current artists, evoking this sense of the majestic attempts to make a reconnection to a feeling of place on a grander scale that is all too often absent in modern life. I believe it is this sense that drives many artists to work in the large scales that they do, even if necessarily accompanied by equally large ego.

The sheer joyous charm of event is an equal element shared with modern environmental art. The rising or setting of the sun in exact alignment over a built marking has as much naive, and profound, wonder and excitement today as it must have had then, even if not today accompanied by the ritual that existed then. Indeed, the arrival of an astronomical or man-made event (as will be discussed in the work of Dale Eldred and Tom Van Sant) is a form of implied or created ritual.

We see this heightened magic of astronomical "event", the anticpation and the moment, in the sun-shafts or

"zenith-tubes" of early civilizations. At Monte Alban (Oaxaca), a narrow tube permits a direct shaft of full, shadowless noonday sun onto a small altar twice a year.

A similar phenomenon takes place at a large megalythic tomb at Newgrange, Ireland, dating back over 5000 years. Sunlight pours down an 80 foot sun shaft onto a ceremonial stone for the two weeks each year surrounding the Winter solstice.(17) The winter solstice sunrise is similarly greated in settings as diverse as a simple, shrine "found" and painted by the Chulmash Indians in Burro Flats, California and the massive constructed complex of the Great Temple of Amon-Re at Karnal. (18)

While modern artists have access to worldwide travel and to history, the urges that direct environmental artists to scale, time, and phenomena are primarily innate. We see these urges in the indigenous "environmental art" of early civilizations scattered around the globe, with no direct contact, discovering and developing the same technologies, applying them within the same contexts, and granting them similar importance.

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(17) Hadingham. Early. p. 52.
(18) Krupp. Echoes. p.131, 253.

All of these physical markings and structures celebrate and denote a cyclical event. In that sense, they are perpetual, their application extending forever forward into time. And yet, the specific events they celebrate are limited in time, lasting from a few brief moments to, at most, days in duration. It is this aspect - the overlap of the momentary and the perpetual - with which my proposed thesis sculpture and the work of a number of recent environmental artists find the greatest harmony.

I want to make note that other cyclical measurements (the days and phases of the moon, the "hours" of the day, the cycles of the stars) also found physical expression in these civilizations. The use of the gnomon, the first "sundial", served as both a measurement of seasonal and daily cycle. This element of shadow, as marker for both cycles, appeared in varied form throughout the civilizations of the globe.

Before I begin my discussion of modern environmental art, it is important to note that these early civilizations created structures and expressions not just in relation to the sun, but to the landscape itself. John Beardsley notes in his book "Earthworks and Beyond" that "a people's

relationship to landscape is one of the most significant expressions of culture, in many respects equal in importance to the relationship of the sacred." This was especially true for the Indian cultures of the Americas. In different forms it applies to almost all cultures (from the the Japanese to the mid-western farmer). The astronomical may often be the context for a structure, but it becomes a subtext to the daily experience of that structure within the landscape.

As I discuss the environmental art of the modern era, I will address first art that had some obvious historicism in its approach and thus employed minimal current technology in its operational function. I will then discuss more recent works that, while retaining a purity of interaction with the environment, employ more current technology, as well as expanded awareness that has come as a result of recent technology.

THE MODERN ENVIRONMENTAL ART MOVEMENT

The element of astronomical orientation in environmental art seems natural, for this art is situated outdoors, where orientation is no longer concentrated on

the centricity of the art object within a protected, neutral setting, but rather within the greater, expansive scale of landscape, horizon and sky. Within this physical and ontological context, an orientation to the sun need not be construed as merely historicism.

Just as many separate ancient cultures independently developed similar indigenous responses to their individual settings, so did/do the environmental artists find at least their primary inspiration in an instinctive response to their natural setting. As the artist moves his working palette outdoors and beyond the scale and concept of object, the influence of the environment, and the requirement of the artist to respond to it, will manifest a certain type or orientation of art. An outdoor setting evokes a "nonanthropocentric view of the world", and current artists are attempting to "reconcile humans with the natural environment and its implicitly sacrosanct character", creating "consecrated spaces for a willfully secular era".(19)

While the environmental art movement encompasses

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(19) Beardsley. Traditional. p.9.

artists whose concerns were varied, from the ecologically and process-oriented work of Alan Sonfist and Hans Haacke to the earth oriented works of Michael Heizer and Robert Smithson(20), I will focus upon artists of this movement who concentrated on an orientation to astronomical phenomena or influences and to scale within the horizontal landscape. These are the artists with whose work I believe my proposed thesis project has the most direct affinity.

I should note that I consider any artwork which exists in three dimensions to be sculpture, and any piece which deals with scale, grand setting or time to be environmental sculpture.

I have mentioned Robert Morris' "Observatory", which Catherine Howett calls a "meditation on time, history, and primative forms". The piece is a circular built earthwork 200 feet in diameter, from within which a viewer can look out to built markers which will frame the solstice and equinox suns. It has direct physical as well as contextural "resonances" with ancient structures, and yet

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(20) Smithson could equally be called an ecologically oriented artist. Like most artists of special quality, his work is varied, and individual pieces might apply to a number of catagories.

it also has a very real sense of the current. As Howett paraphrases Diane Waldman, "these resonances of other times and cultures... do not represent a sophisticated 'archaizing'; rather they impart to work that is thoroughly contemporary in form and association with a larger frame of reference, beyond the known and familiar, stirring the roots of visual and mythic memory". The work itself exists in three physical scales - the 200 foot diameter of the observatory structure itself, the horizon bordered landscape within which the observatory sets, and the 93,000,000 miles axis point of the solstice and equinox sun. It also exists in the temporal scale of day and night and the solar year.

The desert work work "Sun Tunnels" by Nancy Holt engages the sun in a similar solsticial fashion, combined with shadows and light portraying stellar references. But Holt sees her own work in the immediate sense as setting a frame of visual reference within an overwhelmingly panoramic landscape by way of directing perception through visual "frames". This brings the viewer to the center of the landscape ("the center of the work becomes the center of the world"), from which, like the Medicine Wheel or the

stone circles of Britain, they can view out.(21) The most appealing element for me in "Sun Tunnels" is the use of a found industrial object, in this case concrete sewer pipes.

These artists imply a shunning current technology, consciously (or self-consciously) working with the seemingly simpler palette that was available to "earlier" environmental artists. The siting of their work in such removed settings, while essential for providing an open terrain and scale of the landscape, results in pieces that are primarily conceptual, which is quite different from the social context of their historical antecedents.

I find myself more aligned with the work of Walter De Maria. In his "Mile Long Drawing" and his later "Las Vegas Piece", De Maria engages the landscape through a simple, linear demarcation on the landscape in strict cardinal orientations. These pieces, highlighted by the open, uniformly featured planar landscape in which they sit, are primarily concerned with creating "dimensional, directional space".(22)

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(21) Holt, Nancy. "Sun Tunnels", Artforum, v. 15, pp. 32-37, April, 1977.
(22) Beardsley. Traditional. p.38.

In DeMaria's work, there is no center. There is only direction, implied movement, continuum. Each piece is a finite gesture that implies infinity. And yet, like the ancient Nazca lines of Peru, "in spite of the distance involved, there is something intimate and unimposing, even off-hand" about these modest, if long, impositions on the landscape that encourage "the perceiving self [to] take measure of certain aspects of its physical existence".(23)

De Maria's "Lightning Field" has similar elements to his linear works. Simple lines are imposed on a flat plain, in this case in three dimensions, creating an orthagonal grid of thin stainless steel rods. Their precise orientation, yet almost invisible sheerness is quite similar to the effect I expect the installation of my piece to have, although our pieces operate quite differently. The repetition of individual elements, almost monotonously placed, resonates the emphasis on the artwork as a singular whole piece which is found in much of the contemporary art of last 30 years.

This linear orientation of De Maria's work has a

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(23) Robert Morris. "Aligned with Nazca". Artforum, v.14, pp. 26-39, October, 1975.

strong conceptual element which is found in the work of Richard Long. In his "Ten Mile Walk on November 1, 1968", a straight line is imposed on a map and upon a landscape. In this case, the line is a "walk", but conceptually it is similar to the imposition of a line of strobes upon a location.

Both DeMaria's and Long's work are minimal physical impositions - a qualitative description which I feel would apply to my proposed thesis sculpture - and they "disturb the landscape scarcely at all".(24) A more intrusive linear imposition is a 12 foot high steel wall by Robert Irwin that cuts a straight line across a gateway park in Dallas. It is, like the pieces above, a singular linear element inserted into the landscape (here man-made). Conceptually, this fence is like a blade of steel, a fixed rectangle 12' by its many hundred foot length (no publications list the running length), that slices into the landscape. At parts of the hilly park site the ground reaches almost to the top of the wall, exposing only one or two feet of fence. Where there is sidewalk, the fence

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(24) Alloway, Lawrence. "Site Inspection", Artforum. v. 15, pp. 49-55, October, 1976.

is penetrated with a rectangular cut-out. We thus have a physical manifestation of a purely conceptual designation.

Similar physical impositions upon the landscape are found in the conceptual architecture of the young British and Italian Architects of this period (late 1960's through 1970's), such as Archigram and especially Superstudio.(25) The pure linear form of their imaginary structure was more similar to sculpture than architecture.

A different approach to linear imposition, but still carrying many similar aspects of the previously mentioned pieces, is Christo's "Running Fence". This is not a straight, rigid line imposed upon the landscape. The Running Fence meanders to accommodate and reacts to the hilly landscape upon which it sits. But the linear run of 26 miles, while removing the conceptual directionalism of the previous pieces, implies a linear infinity that is at the core of all the pieces I have mentioned above.

For me however, the success of the Running Fence is not its inherently implied extendedness, nor the process which Christo himself emphasizes, but the poetic charm of

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(25) Natalini, Adolfo. Superstudio 1966-1982. Venice: Electa Editrice, 1982.

the piece in its pure, physical beauty and its behavior interacting with the elements. It is important to stress this fact, for although the implication of linearity and scale is an essential element of this thesis and the works discussed in it, a fundamental, underlying essence of an "art work" is its ability to engage, to instill a sense of wonder, awe, beauty, mystery. In my research about the Running Fence, this was what proved truest about the piece in the end - its beauty.(26)

For my proposed thesis piece, the context of it is primary, but for it to succeed, it must charm and engage and delight in and of itself, apart from its conceptual context. It is this charm which first attracted me to plannign the piece.

While the previously mentioned artists of the "land art/environmental art movement" of the 1960's and 1970's, relied minimally on modern technology as an element of their finished works, other artists were employing the latest modern technology as the primary basis of their art.

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(26) Most of the works mentioned previously operate(d) in silence. Running Fence existed actively in the full environmental present, and the sound of its interaction with the wind was an integral part of the whole piece.

The laser began to be appear as an art medium in the mid 1960's with the early, simple graphic scanning work of Lowell Cross and the interior line sculptures of Friedrich St. Florian and Rockne Krebes. The outdoor work of Rockne Krebs (and artists like Dani Karavan and Horst Baumann) involved a linear application with which I find my work strongly associated. These light lines represent the purest, one-dimensional linearity. In applications such as Krebs' "Source", which connected monuments on the Washington, D.C. mall through a single laser line, the beams serve as point to point connectors. But the laser beam implies infinite projection, and so resides in a certain essence with the pieces I have mentioned above.

Paul Earls' laser applications in the Center for Advanced Visual Studies' "Centerbeam" combined the linear directionallity of the laser (and of "Centerbeam") with the graphic scanning capabilities of the medium to create an everchanging and expanding linear solid appearing in Centerbeam's steam (created by Joan Brigham), implying an infinite light solid that grows continuously outward in all dimensions. I find close affinity between my work and the corporeality of this application and its implied momentum

of forward movement. There were numerous additional linear elements to Centerbeam, including a conceived strobe line of Dr. Harold Edgerton operating in similar fashion to my thesis piece, which I will not elaborate on in this thesis.(27)

(I do want to elaborate on the concept of implied momentum. There are not many artworks that truly deal with the real time "sensed" experience of momentum and speed. By "sensed" I mean to viscerally convey or suggest that quality of pushing time, of moving with such momentum that we stretch place. The "Centerbeam" application is one of the few applications in recent art that is successful to my implication of the term. The Futurists spoke of the "dynamism of speed", but that dynamism was hard to effectively portray. One example that succeeds for me is "From the Airplane", an "aero-photograph" by Maseoro, where the visual image actually has been pushed through time and perspctive. Another work that conveys my implication of the word momentum is Harold Tovsih's "Accelerator", where space and substance are again stretched in the moment of

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(27) Piene, Otto and Goldring, Elizabeth, ed. Centerbeam. Cambridge: MIT Press, 1980.

time. Finally, the sudden accelerated outbusrt of fireworks, especially when observed at close proximity, also create a momentary exaggerated perspective that seems to push space and volume beyond the contraints of time.)

There is another essential aspect of the technology of the laser. The laser beam is not only the most absolute of straight lines and thus linear mediums - it is also pure light. The source of the light is not part of the work - only the line of pure light energy, total and complete in itself. This solid visible line of light/color is manifested through illusion, the scattering of photons by the dust, vapor or similar particles that intersect them. In this sense, it shares the characteristic of apparition with my proposed **THE SPEED OF THE EARTH**, implying solid where there is only pure light. But **THE SPEED OF THE EARTH** will not create its illusion through a line of photons. The light line of **THE SPEED OF THE EARTH** will exist only in the retina, the optic nerve, the visual cortex. The laser line hangs solid in space, a continuous wire of light. It is every place at once. **THE SPEED OF THE EARTH** will be an illusion of moving light, of moving line. It will trace the linear, travelling from infinite horizon to infinite

horizon, but it will never be in one place.

It is at this conceptual point that **THE SPEED OF THE EARTH** departs from all antecedant works, whether recent or ancient. For although these pieces all deal with scale, with concepts of line upon the landscape or across the heavens, and with differing levels of orientation, they all remain within the anthropocentric real time realm and perspective of the human.

The solsticial arrival of the sun is gradual. Whether above a temple or through an 80 foot light shaft, arrival is gradual. The daily, hourly, momentary movement of the sun (i.e., the Earth) is sensed only through the infinitesimal progression of shadow moving at less than a millionth of actual speed.

But **THE SPEED OF THE EARTH** will have to live simultaneously in two relative, yet exclusive, perspectives. Unlike the pieces above, with which it shares so much, it is a perpetual event. It implies a fixed circle, but it is only a fixed point. It is a point that is fixed , but it is at no place. It never moves, but is forever seen as moving. It has no stillness, except in idea. With our still eyes, we will see its movement. But

only with our minds will we see its stillness and sense our own movement.

The concept of event, of astronomical alignments in perpetual cycle, or a continuous series of momentary events, is found in much of what is now more broadly called environmental art. (I place my proposed work under this broader heading).

The slow cumulative effect of the sun's progression through the seasons is recorded in Charles Ross' "Sunlight Convergence/Sun Burn", which traces a year of solar movement.

The steady movement, moment by moment, of the sun across the sky is elegantly captured and employed in the work of Dale Eldred. Working primarily with reflectors and diffraction gratings, pure sunlight is captured and reflected or defracted in response to specific alignment of the sun. The angle of incidence of the sunlight upon the material's surface changes incrementally with the continuous rotation of the earth. Each incremental combination of specific light, location, and moment is an instantaneous event. This can play out as a continuum of incidental reflection and diffraction, impermanently

"painting" over a broad canvas of surface and space throughout the day, as in his installation at the Corpus Christi Art Museum(28), or the temporary events ("Time Incident") of a specific alignment of noonday sun reflected to ignite a spectral field 3/4 of a mile across the Charles river, as in his "Sun Structures" installation for the 1981 SKY ARTS Conference(29).

As with Christo's Running Fence, the Eldred pieces, while having a larger conceptual framework within which they were conceived, still succeed as pure visual experiences alone - beautiful, exciting, charming and bold. This is combined with the impressive and attractive craft of the "hardware" and with the involved astronomical aspects of the works, which are presented with a simple directness that immediately translates the conceptual aspects of his work to the viewer. The combination of clairty, beauty and power of Eldred's work is impressive.

An even more complex alignment of momentary incident

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(28) Leifer, Loring. "Color of Time and Space", Interiors. April, 1993. p. 100-103.
(29) Piene, Otto et al, ed. "SKY ART Conference '81. Cambridge: Center for Advanced Visual Studies, Massachusetts Institute of Technology. pp.30-31.

is Tom Van Sant's "Reflections from Earth", employing the technology of satellites, digital imagery, image transmission, detailed computation, and simple mirrors to capture some of the sunlight over an area of more than a square mile and reflect it 600 miles up to a precise point in space to intersect with a passing satellite - a remarkable feat of coordination. In this work, the technologies of the medium remove the immediate experience and the impact of the piece. The facts of the execution of the work - the organization, precision, and precendents of accomplishment - are much of the content of the piece. This is combined with the implications of the resultant image - the simple outline of an eye, the primary instrument of gathering artistic impression and scientific/astronomical information - a simple image (the largest ever made by man) generated and existing entirely and only through the interaction of sunlight and complex technology.(30)

In his more recent GeoSphere project, the combined

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(30) Piene, Otto et al, ed. "SKY ART Conference '83. Cambridge: Center for Advanced Visual Studies, Massachusetts Institute of Technology. pp.7, 32.

images of the whole Earth, artificial in their compilation, but powerfully real in their factual, informational and symbolic totality, create an immediate and telling visual message on the grandest scale, yet with a most direct impact toward our future daily existence.

An even greater scale of dimension is the work of Lowry Burgess. His "Art for Outer Space" projects art into future settings of both place and time, beyond the Earth, beyond the sun, beyond the solar system. His piece "The Quiet Axis" coordinates orientations over time of not just Earth and sun but the galaxies themselves. The piece, with physical components in Afghanistan and Easter Island, was designed to coordinate events with space shuttles crossing points in space as exact as that of "Reflections from Earth".(31)

As stated before, **THE SPEED OF THE EARTH** lies between the basic form and content of the earliest memebers of the environmental art movement and the more recent work involving current technologies. **THE SPEED OF THE EARTH** is quite straightforward and somewhat simple in form and

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(31) Burgess, Lowry. Burgess. Saint-Laurent, Canada: Editions du Trecarre, 1987.

operation, its level of technology fairly low. Its charm is at one level the most basic - the simple thrill and exhilaration of speed and size. Hopefully its tangible display will allow the conceptual implications of the piece to be as easily grasped and as elegantly simple.

A BRIEF EXPLANATION OF THE STROBOSCOPE AND ITS USE

The stroboscope is a instrument based upon the electronic flash system, which systems consists primarily of a flashing lamp whose light output, flash duration and moment of flash are electronically controlled. The primary application of the strobe was and still is to allow the eye to "see" and study fast motions as they occur.

The eye cannot resolve, and the mind cannot store, the discrete elements or events of rapidly moving objects or changing events. Individual events less than 30 to 50 milleseconds apart cannot be discerned as seperate and blend into each other in our perception.

The controlled flash can stop this blur and clearly present discrete events by flashing for as short as 1 millionth of a second, thus illuminating a subject for such a short duration that only the instant, that discrete moment of "stopped" action is revealed. By controlling the frequency of such flashes, a specific sequence of successive discrete events can be captured on film or revealed in real time, "slowing" down or even "stopping" a motion for study by only displaying those descrete events during the motion that we desire to see.

The strobe allowed the unseeable to be seen, and proved an invaluable tool for science and industry, as well as providing a fascinating phenomenon for the curious layman. There are literally hundereds of applications that could be listed, from the study of machines in operation to the mechanics of water streams to the movement of athletes to the capturing on film of instantaneous events.

The primary difference between the stroboscope and high speed photography is that photography captures an instant or instants on emulsion, permanently fixing those instants in time, while the stroboscope "freezes" events in real time, as they are occuring.

While the application of slowing or stopping time was and is the mainstay of strobe or flash technology, other applications for the strobe arose.

Before I go further, it should be explained that the physics of flash technology is quite simply that a gaseous "filament", usually xenon, is heated/energized, illuminates/dissipates its energy, and cools down. The properties of this gas filament allow very rapid heating up and cooling down - thus the shortness of the flash. Because the flash is so short and the gas cools so quickly,

very high energy can be pumped into the gas, giving off extremely bright, if brief blasts of light.

The brightness of the strobe allowed a myriad of other applications, from reconnaissance and underwater photography to locating beams on satellites to flashing safety beacons to sequenced runway approach lights - and to sculptures.

THE USE OF THE STROBE IN ART

I will not go into a lengthy discourse on the use of the strobe in art. It has had numerous applications, most of these employing its ability to slow down motion.

The most typical application for the strobe is its widespread employment in performance and theatrical settings to imply slow motion, allowing artificial "real time" exaggerations of movement and expression..

The artist Wen-Ying Tsai has used strobes to capture the elegant period wave motion of the vibrating rods of his kinetic sculptures, creating shape from a specific combination of captured physical moments.

My application of the strobe is not to slow down motion, but to create motion. It is not to illuminate

and cast light, but to be light.

There is one artist with whose strobe application I find a close philosophic affinity, even if the particular use of the strobe is theoretically the opposite of mine.

The artist Boyd Mefferd created a room of pure strobed light as his contribution to "The Magic Theater", an exhibition in 1968 that featured the some of the most current applications of technological, lgiht and kinetic art of the time. With this piece, Mefferd began to specifically play with the afterimage effects of the strobe, employing specific controlled flashes to paint afterimages and illusion upon the retina. The culmination of this work was his piece for the Art and Technology Exhibition at he Los Angeles County Museum, where the strobe is used to stop, or hold time.

I "experienced" this piece, and its wonder has always stayed with me, both "eidetically" and "savoured".

A darkened room, empty except for the viewer/ occupants, was momentarily flashed with such intensity that the instantaneously lit image of the occupants, frozen in placement, burned fixed into the retina of the viewers. Five or ten seconds later, the event was repeated, changed

now through any movement or change of posture that had transpired in that interval.

The five to ten seconds had lived with the frozen images from the previous flash fixed in the eye and in the mind, so the new postures or positions people had taken during that interval were perceived as instantanious changes. There was no transition between the two images. A person who had been standing, fixed in one location, alive in the afterimage of one's eyes, was now suddenly transported instantaneosly to another location. Physics was defied. Magic had taken place. The flow of events had changed to seperate, complete, self-contained instants of frozen time.

This was no longer the standard, slow motion of continuous movement. This was pure, sustained retinal image suddenly replaced by a new image with no transition between the changed configuration of the occupants. The absolute reality of the images and the seeming impossibility of their succession confronted one's entire perceptual foundation.

My feeling of affinity with Mefferd lies in the effectvie aesthetic essence of his work, which he explained

concisely in the Art and Technology catalogue. He employed strobes, sources of intense, highly controlled pure light, to create works that were "completely discontinuous; which would exist and then cease their existence", where "the experience generated by the light is independent of the tangible light source; one is only conscious of the immediate visual experience which takes place in the eye".(32) *The Speed of the Earth* will operate from this same concept, or perhaps esthetic, of the complete momentary event, discontinuous and intangible, created through technology and expressed through pure light and its impact upon the eye and mind.

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(32) Tuchman, Maurice. A Report on the Art and Technology Program of the Los Angeles County Museum of Art. Los Angeles: Los Angeles County Museum of Art, 1971. pp. 226-235.

A BRIEF PERSPECTIVE ON THE ARTIST'S HISTORY AND HIS MOTIVATION FOR THE THESIS PROJECT.

There are a number of interests and influences in my background which lead logically to this piece.

Most primary are a fascination since childhood with natural phenomena and with scale. There are a number of images that I carry from that period - the dance of cumulus clouds, the endless expanse and continuous sonic rhythm of the Pacific ocean - that affect my current visual/aural experience of the world and drive my work in art. But there are two that apply directly to this piece:

(1) Los Angeles at night, with parallel lines of white and yellow dots of light, receding off to a vanishing point on the horizon, exact and absolute in their orientation yet magical and dreamlike in the illusory shimmer induced by the hot air through which they sparkled;

(2) the August meteor showers of Simi valley, viewed from a sleeping bag in open fields - brief apparitions, quietly blazing in short streaks or long arches across a sky of solid black from mountain horizon to mountain horizon,

except when tinted in multicolors by the subsonic rumbling flames of rocket fuel tests at the nearby Rocketdyne Corporation.

The memories of these bring a Proustian, visceral recall of momentary experience that has an immediate and at the same lasting aftereffect that I call "savour" and will discuss in the conclusion of this thesis. (The artist George Trakas, who was involved in the early environmental art movement and often worked with linear applications in the environment, refers to an "eidetic" human capability to recall visual images with photographic accuracy. I am refering to this, but combined with the emotional impression created at the moment of experience - the "taste" and not just the image.) (George Trakas, "Project in Nature")

One fascination from my youth is primary to this thesis piece. Whenever I was in a car driving near the Los Angeles airport, I insisted that we drive to a point where the road passes under the beginning portion of the airport's main landing runway. From here I could watch the strobed approach landing lights that ran down the runway. These created for me the same wonder and "savour" of the

powerful, grand, yet illusory and sometimes fleeting phenomena I describe above.

I should also note that I am from a Hollywood show business family, and so I experience even the most serious of Fine Arts with an entertainment mindset, always seeking the right mixture of subtle simplicity and dramatic grandiosity. This brings a sense of playfulness and theatricality to even the most profound of my endeavors. It also leads me to simplify my work whenever complexity starts to take on its own momentum. And it demands that process of making remain in the domain of the artist. The "audience" should only be concerned with the pure result and their interaction with it. This is a philosophy that was further emphasized in my work as a record producer. Good record production makes the process transparent. The final product should not reveal the process of making the product to any but a skilled professional. The product must live entirely in the present, after the making process is completed.

This is contrary to the premises of performance art, where the making *is* the product, and to the environmental art of artists like Christo, who see the process as part of

the complete finished product - process as part not just in influence, but in and of itself as well.

I, however, believe the true essence of my work, and in fact a work like "Running Fence", is the finished work itself. The process is of great importance to the artist and the participants enlisted, but the finished work lives in a realm of immediacy and presence.

ADULT ARTISTIC EXPERIENCES:

My interests and endeavors in the arts as an adult bring additional perspective to my work on this thesis piece.

I spent a good part of the mid and late 1960's (my early adulthood) in New York, where I followed the developments in light/kinetic/technological art (including ongoing homage to Thomas Wilfred in my repeated visits to the Museum of Modern Art's "Lumia" "chapel"), as well the experiements in dance, performance and public entertainemnt that were taking place in the city at that very vibrant time (in particular, the work of the Nikolais Dance company and the "environmental" experiments at the short lived event space known as "the Ark").

During the period of my studies in architecture at

M.I.T., in the early 1970's, I had the opportunity to work on a number of outside projects.

I designed a set for dance that was made entirely of laser light. The set would instantaneously change shape through interaction with the dancers, a "geiser stream" of laser light eventual being "pushed back" into the "earth" by the lead dancer. This was my first hands-on opportunity to work with light as a medium to create the illusion of materiality, implying "objects" whose shape and substance could be controlled, penetrated, and changed in a way that no "real" material would physically allow.

I also had my first opportunity to take advantage of the numerous human resources of the M.I.T. faculty, who seemed to find equal satisfaction in the new uses I presented for their technology.

I co-designed a hypothetical reworking of the interior of a Boeing 747 with one of my instructors, Ed Allen. We incorporated my concept of "flight as theater", approaching the plane as a viewing platform for looking down at the earth or up at the night sky. This concept implied that the "stage" or "scenes" for the viewers' entertainment are the breadth of a continent or the dome of

a night sky "planetarium with real stars".

My work with Otto Piene in the development and implementation of a number of large scale environmental and light sculptures involved many technologies and required interaction with numerous consultants, services, vendors, fabricators, etc. This gave me invaluable experience with the many levels of organization necessary to create an artwork of scale and substance, as well as a sense of the courage and persistance necessary to meet all complications with an unflappable problem-solving mindset. I also learned through these projects to allow "the process" to at times lead, to accept the unexpected and incorporate it into one's work, and to know that discovery will be a continuing part of any large scale work. In specific, the unpredicted and delightful behavioral characteristics of a piece such as the "Light Satellite" at the 1972 Olympics taught me to trust in the result to be more than the conceived outcome (certainly more than I personally had anticipated) - that good, instinctive design often knows more than the conscious designer.

I also worked a great deal with laser light both in arena and outdoor settings, again manifesting an implied

material structure within a large scale setting through the use of pure light. By using light in this way, one's work can encompass great scale in the environment without substantial material structure, effort, or disruption. The ease and charm of this aspect of the technology had a profound resonance for me.

All of these works have linking themes. Each is manifested in a large scale environment, and it is their interaction with and in the environment that is their primary essence. Each involves some element of current technology. However, the technology, although it may be the primary agent by which the work is executed, is still employed as a tool and not a context, a means rather than the focus. Similarly, although these pieces deal in pure light, it is the interaction of the light with the environment and with the light in the environment that are for me the essence of these pieces.

THE ORIGINS OF THE THESIS PROJECT:

When I moved from California to New England I was introduced to a phenomenon that had great impact upon my life - the New England sunset. The light of the New

England autumn sky, the effect of land-bound atmosphere upon setting sunlight, produces visual displays that have enraptured me for over twenty years.

The desire to have the sunset never end, plus my interest in sunsets viewed from the air as a result of my work on the Boeing 747 project, eventually lead to a concept for a "sculpture" entitled "AMERICAN SUNSET". It was in theory a perpetual sunset, to be experienced and filmed from the cockpit of a plane flying from East to West at a speed equal to the eastward spin of the earth below it. This would keep the setting sun at a fixed point on the horizon, while the landscape of the earth's surface spun below it - a reversal of the normal sunset, with fixed earth and receeding sun. Practical and technical limitations made it impossible to complete. But the concept of reversed perspective stayed alive.

"AMERICAN SUNSET" had brought to my consciousness the concept of an Earth perpetually spinning on its axis, an event of enormous magnitude that is not consciously manifested in our daily, moment to moment realtime experience. This revelation of scale, combined with the concept of a reversal of relative orientations,

combined in turn with my childhood charm with sequenced landing strobe lights, led to my thesis piece.

THE SPEED OF THE EARTH is founded upon the same basic conceptual premise of "American Sunset" - the changing of one's orientation from our daily (and most primal) experience of viewing the universe from a point of fixed Earth to an orientation of viewing the Earth (and ourselves attached to it) from a point that is fixed in relation to the sun. This implies a real time experience of the Earth as moving in relationship to that fixed point. Such an orientation can be achieved with the illusion created by rapidly moving light.

But the impetus for the piece is not just conceptual. A line of sequenced strobe lights, set in any number of various landscapes and locations, will create illusions of boundless dimension and exhilarating speed. This aspect, the sheer "brute" scale in both length and velocity, is the most visceral and charming element of the sculpture.

At the same time, the almost super-reality of the illusion and the simple beauty of the pure light are also elements which are in their own right of importance to me and thus for the viewer.

It should be noted that the depiction of speed presented here is unique. There is no opportunity in our normal life circumstances to experience that magnitude of speed in such close proximity. The experience is quite special and so alien to our normal frames of reference that it becomes for that moment our complete universe.

This immediate experience of speed and setting also offers a concrete depiction of a concept that is otherwise almost impossible to grasp existentially from the relative orientation of our human scale and centricity.

The concept of time is primary to the piece, as it is with so many environmental pieces. **THE SPEED OF THE EARTH** deals with momentary time and perpetual cycle, with instant and everlasting. For a strobe line of 1000 ft., the event of the strobe sequence is less than one second long. The illusion of the streaking ball of light is barely discerned before it disappears. Only the aftertaste, the "savour" lingers. When one considers that the Earth and we upon it are in fact travelling at that speed, the scale of the Earth and its relation to the cosmos come more sharply into focus. When we consider that this streak of light, representing a fixed point in space, moves quickly beyond

the horizon and that we will not spin by it for another 24 hours, the sheer size of the earth is dramatically drawn into consciousness. If the sun were overhead, it would be moving, relative to the viewer, at the same velocity as the strobe sequence.

The piece as initially conceived was to be sited in a vast open area, such as open desert of hills and plains with negligible vegetation - similar to the settings De Maria insists upon.. It was to stretch for whatever length was economically possible, preferably two or three miles so as to seem to continue endlessly beyond the horizon. In the process of developing my thesis, I developed a new perspective on siting the piece, which I will discuss later in the thesis.

THE THESIS SCULPTURE AS ORIGINALLY PROPOSED

OPERATION AND LOCATION. My thesis sculpture, as originally proposed, was to have consisted of 20 strobe lights stretching along a 400 foot line running East to West from the walkway next to the Kresge Chapel across the grass field and through the glass corner of Kresge

Auditorium toward the Johnson Sports Center. Each strobe unit would consist of a strobe lamp mounted atop an 8 foot pole. A single sequence of the 20 strobe lights firing would take approximately 1/3 of a second to complete.

My original intention for the Kresge siting of the piece was to present the piece in association with a CAVS sponsored symposium that was to have taken place in June of this year. The postponement of that symposium for a year has made the execution of the piece at the Kresge location impractical for this year. A new site is therefor planned and detailed below.

MATERIALS AND COMPONENTS. Preliminary research into fabrication of the piece suggested that the wisest, most reliable, and thus in the end most economical approach would be to use pre-existing strobe units.

The first type of units investigated were two types of FAA approved ALS (Approach Landing System) strobe systems commonly used at airports. The specific units employed at the auxilliary runway at Logan airport were mounted in attractive housings and would reliably withstand almost any weather condition. This type of unit had been

working in the field for many years and are "mass produced". The FAA graciously triggered them for me in a number of different power, duration and sequence speed modes, and the units proved more than adequate in performance. The problem with them was that they were cumbersome, relying on an outdated technology that would not be upgraded until new FAA regulations were written. In the end they proved too expensive and archaic to employ.

This led to an investigation of the most advanced mass produced stobe systems - Machine Vision Strobes (MVS), created for industrial applications. These units were as compact as the ALS units were cumbersome. The manufacturer, EG&G, presented a number of system component combinations, but in the end, they proved too difficult to adapt for outdoor use.

A middle ground was found in the mass-produced units manufactured by Whelen Engineering for aircraft, emergency vehicle and general purpose warning beacons. These units are weather resistant, operationally reliable, easily maintained, and long lasting. The only drawbacks in the available off-the-shelf units were that the standard self-contained units were not externally triggerable and the

standard externally triggerable units needed external power supplies and voltage converters. I therefore commissioned a redesign of the circuitry of one of the standard models, which will be manufactured for me. Details are described below in the description of the Briggs Field installation.

A DESCRIPTION OF THE THESIS SCULPTURE

The thesis piece will in fact be in two forms. The official thesis project piece to be presented on May 9th is a working 1/8" to 1' scale model of a full size system to be installed next year at the Kresge sight described below and depicted in the model. A full scale working installation of the system will be displayed June 9 - 11 on Briggs FieLd at the M.I.T. campus.

THE MODEL

The 1/8" to 1' scale model of the piece consists of an extant 66" by 84" scale model of the Kresge site on which are mounted 20 LED's depicting the actual location, firing sequence and timing of full scale operation. The triggering system for the model will be the prototype of actual triggering system for the full scale piece. The 20 LED's, mounted on scale "poles", will fire through an entire sequence in 335 milleseconds, the length of the full scale sequence.

Because the model of Kresge Auditorium employed for the thesis presentation is the original model from the offices of Eero Saarinen, and therefore cannot be altered,

wiring for the LED's must remain exposed. It will, however, be camoflaged to be unobstrusive, if not unnoticable, especially in the dimmed lighting of the presentation room.

The working model will be on display May 9, 1993 in the exhibition room of the Center for Advanced Visual Studies.

THE FULL SCALE INSTALLATION ON BRIGGS FIELD

The installation on Briggs Field will be presented on during the week-end of June 11 & 12, in conjuction with a Sky Art presentation by Otto Piene and the Center for Advanced Visual Studies.

The installation will feature 50 strobe lights, mounted on 6 - 8 foot high poles, placed at 20 foot intervals on an east/west axis, spanning a total length of 1,000 feet. A single 120 VAC power line and a single 7 stand trigger signal cable will run this entire 1,000 foot length, with junctions at each pole base. The wires may be submerged in the earth at a minimal depth and/or may be carried for the entire run in modular sections of PVC tubing with appropriate junction boxes.

Each "unit" will consist of a completely self-contained lamp unit mounted on a single pole.

The lamp units are Austin Series 1000 modified Compact Stobe Beacons. These units will be self-contained, consisting of a clear plastic optical lense with sun-shield and internal reflector, a power supply for operation from 120 VAC ± 10%, an 8-watt fashtube, and a threaded mounting base with AC and amphenol connectors for power and signal.

Each lamp will be mounted upon a 3/8" to 1" OD PVC or steel pipe, 6 - 8 long, with attached or permanently mounted "spade" for mounting in earth and internally mounted power and trigger supply lines with AC and amphenol connectors (connection at the lower end of the pipe will be through side port/"junction box".

If piping is required to shield cabling, 4', 8', and/or 10' section of PVC will be employed, with end connectors and junction boxes for each pole location. If piping and/or wiring must be submerged, a narrow 2" x 2" trough will be dug and temporarily covered over. Sod will be removed so as to be fully replacable after dismantling.

Power for all units will come from one 15 amp 120VAC supply line (source location still being negotiated).

Trigger supply will come from a triggering box mounted at the eastward end of the piece. Low voltage trigger signals will be multiplexed based on a 2 to the 7th power binary system.

The piece will be installed over a three day period, employing a crew of five people, including one surveyor for accurate east/west and double axis vertical alignment. Security will be supplied throughout the installation, opertaion, and dismantling of the piece. Dismantling will take one 12 hour day.

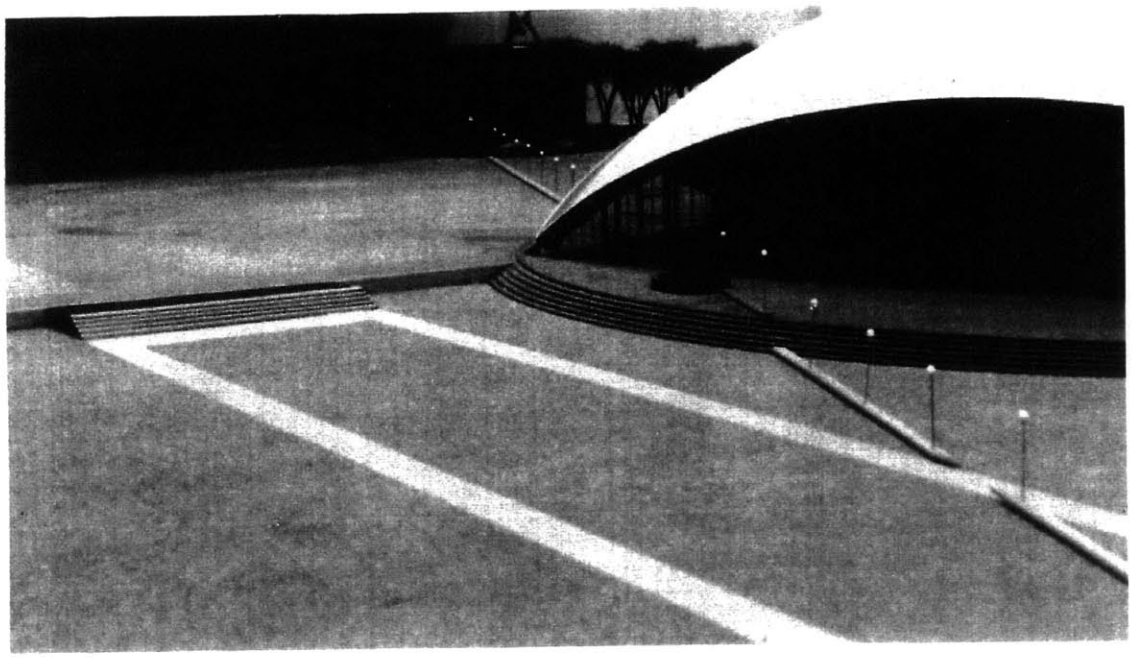
All necessary clearances with M.I.T. offices of Safety, Grounds, Security, and Athletics will be secured.

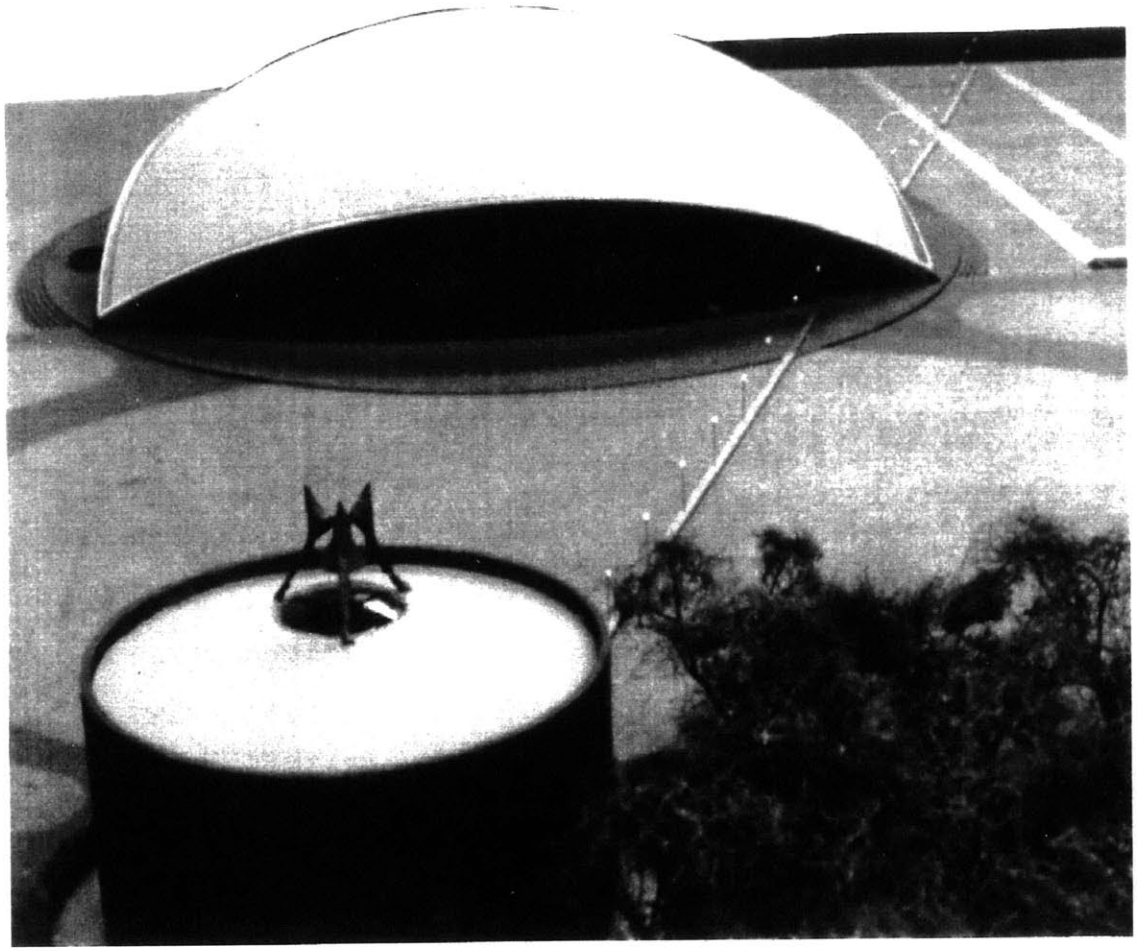
The piece will operate from 6:00 pm to midnight, with some possible operation during daytime hours. Each sequence will last 887 milleseconds for the entire 1,000 foot run. The frequency of sequences will vary from one every 6 seconds to one every minute, commencing at 6:10 pm after a single sequence at 6:00 pm and ending at 11:50 pm, with a single sequence at midnight.

These individual opening and closing sequences are to emphasize that the piece in its purest conceptual orientation should operate only aa a single sequence per

day, for the ball of light that flashes by us at such breathtaking speed will in fact take 24 hours to make one latitudinal circumnavigation of the globe. That is truly how long it takes for the earth to spin one full rotation at that great speed and return to that specific "point of light". The truest essence of the piece resides in that presentation - to wait for that long a period for a light that passes so quickly covering so much distance in the blink of an eye, quickly brings to consciousness the real magnitude of the size, the breadth of the earth, and hopefully gives pause.

There is also a ghostlike charm in having the light appear for one brief moment and then be gone. An apparition - perhaps a shooting star crossing the landscape.





SELECTED BIBLIOGRAPHY

Alexenberg, Mel & Piene, Otto. "LightsOROT". Cambridge: C.A.V.S./M.I.T., 1988.

Beardsley, John. Traditional Aspects of New Land Art. Washington, D.C.: Smitsonian Institution Press, 1978.

Brecher, Kenneth and Michael Fiertag, ed. Astronomy of the Ancients. Cambridge: The M.I.T. Press, 1979. p. vii.

Burgess, Lowry. Burgess. Saint-Laurent, Canada: Editions du Trecarre, 1987.

Burnham, Jack. Beyond Modern Sculpture. New York: George Braziller, 1968.

Coe, Ralph. "The Magic Theater". Kansas City, Mo.: The Circle Press. 1970

Edgerton, Harold. "Electronic Flash, Strobe". Cambridge: The M.I.T. Press, 1979.

Davis, Douglas . Art and the Future. New York: Praeger Publishers, 1973.

Edgerton, Harold. Electronic Flash, Strobe". Cambridge: The M.I.T. Press, 1979.

Hadingham, Evan . Early Man and the Cosmos. New York: Walker and Company, 1984.

Havlice, Patricia. Earth Scale Art. Jefferson, N.C.: McFarland & Company, Inc., 1984.

Kepes, Gyorgy, ed. Arts of the Environment. New York: George Braziller, 1972.

Krupp, Dr. E.C. . Echoes of the Ancient Skies. New York: Harper & Row, Publishers, 1983. pp. 214-220.

Lightman, Alan. Great Ideas in Physics. New York: McGraw-Hill, Inc., 1992.

Lippard, Lucy R.. Overlay. New York: Pantheon Books. 1983.

Lista, Giovanni. Futurism. New York: Universe Books, 1986.

Morris, Robert. Aligned with Nazca". Artforum, v.14, pp. 26-39, October, 1975.

Natalini, Adolfo. Superstudio 1966-1982. Venice: Electa Editrice, 1982.

Piene, Otto & Goldring, Elizabeth, ed. Centerbeam. Cambridge: M.I.T. Press, 1980.

Piene, Otto et al, ed. SKY ART Conference '81. Cambridge: C.A.V.S./M.I.T., 1981.

Piene, Otto et al, ed. SKY ART Conference '83. Cambridge: C.A.V.S./M.I.T., 1983.

Popper, Frank. Origins and Development of Kinetic Art. New York: New York Graphic Society, 1968.

Robinson, J. O. The Psychology of Visual Illusion. London: Hutchison & Co., 1972.

Rose, Barbara, American Art Since 1900, rev. & expanded ed. New York: Praeger, 1975.

Sonfist, Alan, ed. Art in the Land. New York: E.P. Dutton, Inc., 1983.

Tuchman, Maurice. A Report on the Art and Technology Program of the Los Angeles County Museum of Art, 1971.